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# Shortstop

## Electronic Protection System

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Throughout modern warfare, the thunder of incoming artillery has caused soldiers to take cover to avoid the lethal effects of flying shrapnel. A new system is being developed that will provide

them with some protection from the type of fuse most lethal for soldiers—the proximity fuse.

The Shortstop Electronic Protection System (SEPS) is a passive, electronic

countermeasure that detects the proximity fuses armed on incoming artillery, mortars, or rockets and prematurely detonates the warhead in the air, short of the desired target. The resulting

high-altitude air bursts of the pre-detonated rounds give soldiers early warning of an attack while reducing casualties.

A proximity fuse sends out a radio signal that an altimeter in the fuse uses to determine height above the ground. The fuse detonates at a predetermined distance from the ground every time and achieves maximum effectiveness. A mechanical or an electrical time fuse requires accurate terrain elevation information and a well-trained fire direction crew to calculate the correct time setting. Often, the first round from a fuse of these types detonates too early and is ineffective, or it detonates too late and acts like a point-detonating fuse. Accurate, air-burst, high-explosive rounds have a devastating effect on troops in the open and on soft-skinned targets. The air-burst, high-explosive shell fuse combination is six to ten times more effective than the same high-explosive round using a point-detonating fuse.

Proximity fuses are inexpensive to manufacture and can be used by trained and untrained artillery crews alike. Because of its ease of use, availability, and cost effectiveness in achieving maximum effect on a target, the proximity fuse is a significant concern to soldiers on the ground. The Shortstop system protects the force by keeping the proximity fuse from accomplishing its intended purpose.

The SEPS design is made up of a core receiver-transmitter about the size of a single-channel ground and airborne radio subsystem (SINCGARS). For maximum flexibility of employment, SEPS will be integrated into three variants—manpack, stand-alone, and vehicular. The manpack variant, which will weigh approximately 25 pounds, will be used by light infantry units while stationary and on the move. The stand-alone variant, which will weigh about 50 pounds, can be used with external power to protect stationary, high-priority targets such as command posts, ammunition dumps, motor pools, re-arming and refueling points, and helicopter staging areas. The vehicular variant will be configured for the host



vehicle and powered by the vehicle's electrical system. It will be mounted on unarmored vehicles to improve survivability while in bivouac and on the move and will have an antenna similar to that on the stand-alone variant.

The Shortstop program was initiated in 1990 by the U.S. Central Command (CENTCOM) as a quick-reaction response capability for Operation *Desert Storm*. Intelligence reports at the time indicated that most of Iraqi indirect fire munitions were equipped with radio frequency proximity fuses for air burst to ensure maximum efficiency for their munitions in a desert environment. Thirty of the first-generation Shortstops were fabricated but never shipped due to the short duration of the war. These systems were placed in contingency storage and were recently used in Bosnia to protect the force from potential artillery or mortar attacks.

Proponency was assigned to the U.S. Army Infantry Center, and an operational requirements document was written and approved in June 1994. The program is under the auspices of the Program Executive Officer for Intelligence, Electronic Warfare and Sensors (PEO/IEWS) with the product manager (PM) for Firefinder managing materiel development. The program is now in

engineering and manufacturing development with test hardware being fabricated (three of each variant). In contractor tests at Yuma Proving Ground in March 1997, the stand-alone SEPS successfully defeated M732, M734, and MK14 proximity-fused artillery, mortars, and rockets fired in shots and six-round volleys. The results of these tests are encouraging as we make preparations to conduct further testing. An integrated operational development test is now in progress.

Through the application of common technologies in multiple systems, SEPS has the potential for integrating this capability into aviation weapon systems to pre-detonate proximity-fused surface-to-air or air-to-air missiles. The technology is also planned for ground weapon systems countermeasure systems for additional force protection.

The Shortstop is intended for employment in areas where an opponent can be expected to use proximity-fused munitions. These areas tend to be arid, desert, flat or rolling terrain, high plains, beachheads, rice paddies, snow or ice fields, and similar geographical locations not restricted by vegetation or urban development.

The oval safety zone provided by the Shortstop varies with the power output

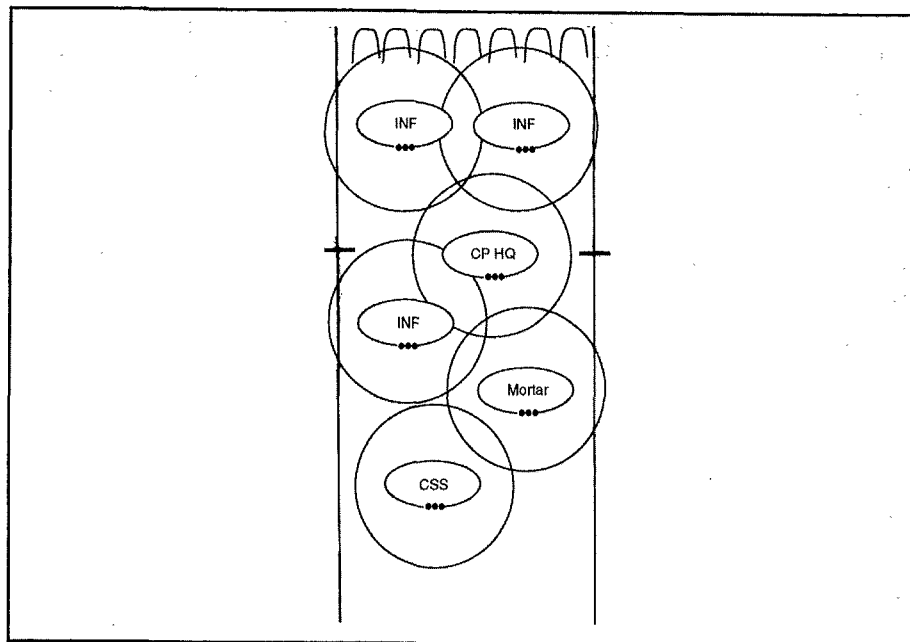


Figure 1

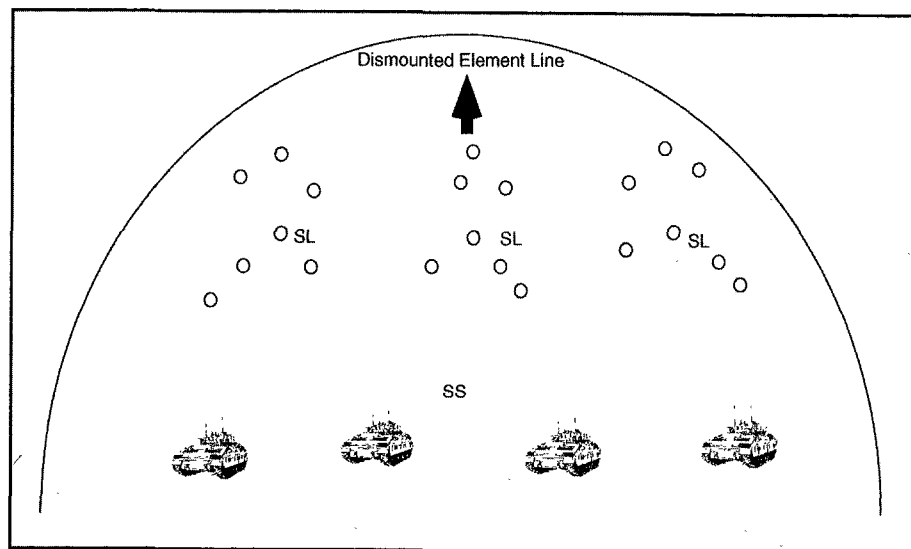


Figure 2

and the antenna design. One manpack Shortstop provides an oval safety zone roughly the size of a football field. The stand-alone and vehicular variants protect a somewhat larger area because of their larger antennas and additional power. For convoys or large fixed facilities, more than one Shortstop is needed for adequate protection.

Shortstops will normally be employed on a basis of one per platoon. Figure 1 shows one in each platoon-sized element of a mechanized unit. The system should be emplaced to take maximum advantage of its protective

electronic footprint. Proper positioning significantly increases the zone of protection, thereby improving the survivability of the force. The Shortstop is not needed in heavily forested areas, jungle with heavy vegetation canopies, or inside bunkers or buildings, because air-burst fuses are not effective in these locations.

With a dismount element of a mechanized infantry platoon, one properly employed Shortstop will protect the platoon. (Figure 2).

In a convoy, the Shortstop is placed behind the lead element or vehicle.

Large convoys should use more than one system to provide overlapping coverage and to accommodate high-trajectory mortar fire protection.

During river-crossing or mine-breaching operations, Shortstop protection is normally provided by the unit responsible for preparing the operation, not by those planning to pass through the crossing point or breach. Units traveling with Shortstop through the crossing point or breach should operate in the receive mode and allow the systems supporting the crossing point or breach to suppress artillery and mortar fires. After passing through the units that have Shortstops, the maneuver unit should switch to the operational mode. Stand-alone Shortstops should be recovered and moved with the maneuvering force to the next crossing point.

Some of Shortstop's greatest benefits are in the support of static operations of combat support and combat service support units. These operations consist of the forward command posts responsible for the reporting, directing, and controlling of artillery and mortar batteries, checkpoints, forward sensors and observation posts, staging and tactical assembly areas, communication sites, forward support teams, and forward arming and refueling points.

Army forces have always participated in support and stability operations. They have protected citizens at the edge of the frontiers of an expanding America; built roads, bridges, and canals; assisted nations abroad; and served our nation in a variety of other missions. The pace of these types of operations has increased in recent years, and they appear to be more and more hostile and dangerous to friendly forces trying to restore order, peace, and tranquility in areas around the world.

Support and stability operations are intrinsic in a deployed unit commander's peacetime theater strategy, an ambassador's country plan, and civil assistance at home. Soldiers serve daily in this capacity. Military police assist in the restoration of civil order; medics provide advice on preventive medicine; field hospitals provide health care to refugees; and mobile training teams

enhance local military expertise in securing their nation's interests.

The Shortstop is ideal as a force protection multiplier from artillery and mortar attack during support and stability operations. The use of radio proximity fuses provides the sought-after psychological effects that give quick visibility to terrorists or paramilitary causes. During such contingencies, the Shortstop provides perimeter and flank security from surprise attacks or harassing indirect fire. The Shortstop is generally compatible with other force protection equipment, yet does not bring with it the controversy and collateral damage of a lethal weapon system.

Part of the requirement for the Short

stop is the need to provide an adequate training device for the system. Efforts will be made to develop a device that will simulate the Shortstop hardware and be capable of interacting with the simulated area weapons effects-radio frequency (SAWE-RF) devices now used at the Army's combat training centers for indirect fire systems. Additional training will be needed on tactical employment, operator maintenance, and optimum location selection for the Shortstop systems within the task force.

History has shown that the Infantry sustains most of its combat casualties from indirect fire. The most serious threat comes in the form of a surprise attack from air burst munitions when

the force is moving, or when it is static in unprotected positions. Although Shortstop is not a complete solution, it will provide a cost-effective means of warning soldiers of an immediate threat, reduce the effects of the threat, and give soldiers time to take cover.

The Infantry Center plans to continue its efforts to develop and field this system to light forces and others in need of the type of protection that Shortstop offers.

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